state & society

Harwell's industrial-contract research thrives

Since 1946 the Harwell Laboratory of the United Kingdom Atomic Energy Authority has been the place where Britain's research into reactors and reactor materials has been concentrated. During the last few years it has added a new role to this traditional one; the laboratory is engaging in contract-supported applied research for private industry. The fields of research are not limited to nuclear technology—many of them are "spin-off" technologies in areas where Harwell has special experience. They include radioisotope applications, electronics, mechanical engineering, chemical analysis, materials science, computing and cryogenics. Recently PHYSICS TODAY visited Harwell to talk to its director, Walter Marshall, and to find out more about this program.

During the past decade Harwell has seen its original role in British nuclear-energy research dwindling; the reactor research it grew up on is not finished, but staffing and funding for this work have both been steadily reduced since the middle 1960's, with the decision to go ahead with the construction of fast-breeder reactors. The development of the next generation of reactors proceeded, but the scale of effort required at Harwell became smaller. So, despite the continuing importance of this original role, the laboratory needed new objectives to stay healthy—but what were they to be? Could they be related to the earlier programs?

When we last talked to Marshall four years ago (PHYSICS TODAY, August 1968, page 66) he was new to his job and spoke more about plans for the future than about the then current situation. The major problem facing the UK, as Marshall saw it, was industrial growth and innovation; he therefore added to Harwell's atomic-energy program its new role as an innovator of ideas and as a contract-research organization—a novelty for a laboratory traditionally performing open-ended research supported by government financing. We started our recent conversation by asking him how it had worked out in the intervening four years. "Far better than I would have hoped," he answered, "Far better than I would have expected."

Problems. Of the several problems that had to be overcome, one was to get the principle accepted as a sound and viable idea. To many people it seemed somehow unnatural that a traditionally single-functioned laboratory should go multifunctional—they argued that it would "lose its way." Marshall admits that a single well defined mission for a laboratory is an attractive concept, but he says you must always face the fact that eventually that mission will be accomplished—and then what do you do? The argument that Harwell should be multifunctional was helped by the publication last year of the Rothschild Report, titled "A Framework for Government Research and Development," which discusses government policy in funding all areas of research. Although concerned largely with medical, agricultural and environmental research, the report's arguments in favor of multifunctional laboratories were very help-

continued on page 63

MARSHALL

Survey finds physicists on the left

The political leanings of academic scientists are a function of their discipline, and physicists are the most liberal in the natural sciences. The most eminent and successful scientists generally hold more liberal views than their less well known colleagues. These are some of the findings of a survey conducted by political scientist Everett C. Ladd of the University of Connecticut and sociologist Seymour M. Lipset of Harvard (*Science* **176,** 1091, 1972).

In 1969 the Survey Research Center at Berkeley surveyed just over 60 000 full-time faculty members including 1707 physicists, 1884 chemists, 2916 mathematicians, 812 geologists, 4567 biological scientists, 2395 faculty in colleges of medicine and 4382 engineers as well as faculty members from the social sciences, humanities, law, fine arts, education, business and agriculture. Ladd and Lipset then analyzed the Center's data.

They find that "the faculties of the various academic fields are sharply differentiated in their politics." Physicists are the most liberal group within the natural sciences and engineering and are slightly to the left of the professoriat as a whole. Working with a variety of items measuring liberalism, Ladd and Lipset constructed a five-item scale including questions on rioting by blacks, legalization of marijuana, racial integration in public elementary schools and the US policy in Vietnam; in addition each respondent was asked to evaluate his own political position. Other political questions were also asked.

On particular political issues, physicists had the greatest opposition to the

Vietnam–Laos–Cambodge." The group asked about his role in Jason and about the bombing of dikes. Gell-Mann is reported to have said he had come to discuss physics and not Indo-China; he then gave his planned lecture. The following day the demonstration occurred again, but this time, according to French newspaper accounts, Gell-Mann was escorted to the street by administrators from the college.

At the Institute Guglielmo Marconi at the University of Rome, in the beginning of July, Drell was to give a theoretical-physics seminar. A group of demonstrators demanded that Drell denounce US policy in Vietnam and discuss and denounce his role in Jason. Drell refused, but for ten minutes he discussed Jason and giving advice to the government; after that the demonstrators left and Drell began his physics lecture. About 15 minutes later a larger group, employing a bullhorn, returned and protested much more intensively; so Drell simply gathered up his papers and left.

Three weeks later Drell and two other physicists were to lecture on quantum electrodynamics at the summer school of the Institut d'Etudes Scientifiques de Cargese in Corsica. It was the last week of a four-week summer school, which was attended by 25–30 students plus faculty. Again Drell was asked to denounce his participation in Jason and to condemn publicly "American war crimes." Drell refused, offering instead to discuss Jason with the students any time after giving his first physics lecture. This offer was rejected, and then Drell asked those who wanted him to start lecturing to stand. Only about five students rose, and Maurice Levy, director of the institute, said that if Drell could not talk the school would terminate. Levy then gave the students until noon the next day to find a way to let Drell give his physics lectures. Efforts to resolve the conflict failed and the school ended a week early.

At Columbia a campaign against the Jason group is being conducted by the New York SESPA group, according to Foley. Since March, every Wednesday the group has been picketing the front door of the Pupin physics building and handing out literature. Foley told us that at the end of April, when many US campuses were in turmoil, the SESPA group, together with a group of faculty members from other New York colleges, occupied Pupin for four days. Things then quieted down. In June Ruderman's apartment house in Greenwich Village was picketed by demonstrators who handed out literature about his involvement in Jason. In August demonstrators held a 24-hour vigil at Foley's apartment house in Manhattan; as a result, he says, he received a couple of poison-pen letters. The other Columbia members of Jason, Norman Christ, Garwin and Leon Lederman, do not live in Manhattan. Foley says the object of the SESPA action is to force the Jason members to resign. —GBL

Congress increases NSF funds for 1973

Congress has appropriated $619 million plus $7 million in foreign currency for the National Science Foundation for fiscal year 1973. More funds have been given for some education programs than the administration had asked for, and the overall program received more than the requested $647.418 million plus $7 million in foreign currency.

The $619-million sum is the same amount as was appropriated for FY 1972, but funds that had been impounded by the Office of Management and Budget in FY 1971 and FY 1972 because of the Administration's wish to cut back on spending for education and for institutional support of science were freed for FY 1973. These funds together with the foreign currency bring the total NSF funding up to $657.2 million. Of the freed funds, $9.5 million from FY 1971 and $21.7 million from FY 1972 may be used for any part of the NSF program.

For the third year in a row, Congress has granted more money than that requested by the Administration for education programs. NSF had asked for $12 million for the Institutional Improvement for Science program, but Congress instructed NSF to spend at least $18 million, down $3 million from the FY 1972 level. An increase of $6 million over the requested funding level was also ordered for graduate-student support, bringing it to $20 million, the same amount allotted in FY 1972. Congress added $1.0 million to the $70 million requested for the Science Education Improvement Program, a total of $71.0 million, $4.9 million more than in FY 1972. —SMH

Harwell

continued from page 61

ful in answering these critics. Harwell was in fact already operating very closely in accordance with various recommendations of the Rothschild Report.

A second problem was that of persuading British industry to accept the idea and come forward with ideas and projects. Marshall knew in 1968 that there was not a good tradition in the UK of industry placing contracts for extramural research, but he thought this tradition could be broken. Events appear to be proving him right. In the 1971–72 financial year the Harwell and Culham (fusion) laboratories of the UKAEA received a total of £6.1 million for research not directly oriented towards nuclear reactors; £2.5 million came from industry and the remainder from the government. In the present financial year the comparable figures are £7.4 million total, with £3 million from industry, and in 1973–74 the income from industry is expected to be £3.4 million. So the share from industry has been rising, and by 1975 it is expected to amount to about 50% of the total nonreactor research funds. Work on reactors and what is called "underlying research" directed towards reactors is separately funded by direct government grant. In 1971–72 this reactor research accounted for about 55% of the total income of the laboratory from all sources.

Because of the general economic depression in the UK, Harwell's work for industry has not increased as fast in the last 12 months as had been hoped. Marshall thinks there are signs that it's beginning to pick up again, but he has a slight worry that his plans depend on a return of confidence in the British industrial scene. "If that turns sour, we might find ourselves in some difficulty." The contracts are not limited to British industry—a few are from abroad, and there have been "lively discussions" with some US firms—but foreign support is as yet a small part of the total.

In terms of manpower, the size of the Harwell laboratory is still decreasing, as it has every year since 1962. Whether that trend can be reversed depends on whether the industrial-contract work can grow at a rate large enough to offset the rundown in reactor research. Marshall hopes it can; he points out that if you have a continuous decrease over a period of a decade you start getting age imbalances, and the overall health of the organization suffers. Here again he is supported by the Rothschild Report, which maintains that the size of an establishment should vary depending on the demands of the program, not upon political judgments. While admitting that the laboratory is not compensating for all its "wastage"—retirements and resignations—Marshall says he is recruiting "at a modest level, and a substantial fraction of that level consists of Britishers who wish to return to this country from America."

We asked what exciting physics research was in progress at Harwell. Marshall listed several topics, including Mössbauer work on biological compounds, surface phenomena over a wide area of science, catalytic phenomena observed with electron microscopes, laser-scattering investigations of turbulence, and ultrasonic holography.

But the item that brought a special gleam to his eyes was the package of research on radiation damage and the creation of voids, which has a direct practical application to the fast-reactor materials problem. Ron Bullough has been the theorist on the project, and experimental work has been in the hands of R. Stuart Nelson and John Makin. Theory and experiment have combined to explain how different damage rates lead sometimes to voids and why they form in some cases and not in others. "Quite an impressive piece of work," as Marshall put it.

In contrast the industrial-contract work is much more applied to industry's needs. Typically Harwell helps individual manufacturers develop units such as gauges or analyzers for solving a particular production problem. This is the aspect of Harwell's work that is currently growing.

Marshall admitted that life nowadays is very tough and money is very short for his general programs. "Everywhere people are having to tighten their belts very hard or earn money from other sources. With this new commercial program I can at least see a light at the end of the tunnel."

—JTS

NOAA opens new data center for geophysics

The National Oceanic and Atmospheric Administration has opened a National Geophysical and Solar–Terrestrial Data Center, in Boulder, Colo. The center maintains records in the fields of seismology, geomagnetism, marine geology and geophysics, solar activity, interplanetary phenomena, the ionosphere, cosmic rays, auroras and airglow.

The center provides, on request and at nominal cost, primary data from national and worldwide sources and issues a variety of regular and special data publications. Archives are available to visiting scientists, and advance arrangements are preferred. Inquiries should be directed to NOAA Environmental Data Service, D6, Boulder, Colo. 80302.

in brief

Proposals for the 1973 Bendix awards of the Society of Physics Students must be sent in by 15 Nov. The awards, which go to SPS chapters to fund research or educational projects, come from an annual $3000 grant from the Bendix Corporation.

A new edition of *Graduate Programs in Physics and Astronomy and Related Fields*, which provides current and comparative information of doctoral and/or master's degree programs in over 300 institutions of higher education in the United States and Puerto Rico is now available. A new feature is the listing of 50 doctoral programs in fields to which physics bachelors may wish to transfer. The guide costs $7.50 if payment accompanies the order, $1.00 more for non-cash orders, and may be ordered from AIP, 335 East 45th St, New York, N.Y. 10017.

Comments on Plasma Physics and Controlled Fusion, coordinated by Burton D. Fried of the University of California at Los Angeles, is being published bimonthly by Gordon and Breach. Subscriptions, per volume (with six issues to a volume), are available to individuals and libraries at $11.00 and $35.00, respectively.

Environmentally-concerned professionals who wish to have their name and a short resume appear in the annual Directory of Environmental Consultants should send a no. 10 self-addressed envelope to the Directory of Environmental Consultants, P. O. Box 8002, University Station, St. Louis, Mo. 73108.

Copies of the National Science Foundation report, *An Analysis of Federal R&D Funding by Budget Function, 1960–72* (NSF 71-25), are available from the Superintendent of Documents, Washington, D. C. 20402 for $1.75 a copy.

the physics community

Institute of Physics elects new officers

Sir Brian Flowers is the new president of the (British) Institute of Physics. He is on leave from the University of Manchester and is chairman of the Science Research Council; in October 1973 he will resign from the Council and become rector of Imperial College, London. He replaces James W. Menter, the Director of Tube Investments, Ltd. The Institute of Physics' new vice president for meetings is Peter F. Chester of the Central Electricity Generating Board, North Western Region. Hyman Rose was elected honorary treasurer and Robert Press was reelected secretary. Elected ordinary members of council were Joseph Evans and William J. Meredith.

The Institute, after a deficit of £35 000 last year, will increase membership fees up to 40% this year. Two attempts to raise the fees had been made previously, but they failed to win the necessary 75% majority.

APS committee wants to update women's roster

The American Physical Society's Committee on the Status of Women is preparing a supplement to update the Roster of Women Physicists. The committee would like to make the roster as complete as possible and urges women physicists who have not yet filled out questionnaires for the roster to do so. They can be obtained from Elizabeth Baranger, Committee on the Status of Women in Physics, Rm. 6-405, MIT, Cambridge, Mass., 02139. By "physicist" the committee means women with bachelor's degrees or higher who are actively engaged in physics-related work, as well as women with advanced degrees in physics who are working in nonphysics areas or are at present not working.

JETP to celebrate its hundredth anniversary

In January 1973, physicists in the Soviet Union will celebrate the centenary of the establishment of the physics part of the *Transactions of the Russian Physical and Chemical Society*. This section was split off from the parent journal in 1931 to establish the *Zhurnal eksperimentalnoi i teoreticheskoi fiziki*. AIP has been translating this journal since 1955 as *Soviet Physics-JETP*, and this period coincides with the term of the current editor of the Soviet publication, Peter L. Kapitza.

Enter now for AAPT apparatus competition

The semiannual American Association of Physics Teachers apparatus competition will be held at the New York meeting of the American Physical Society and AAPT in January. Models of demonstrations or lab apparatus that are suitable for introductory physics courses are solicited from college and high-school teachers. Entries are welcome from all countries. For further information and entry forms, write to F. E. Christensen, Apparatus Competition Director, St. Olaf College, Northfield, Minn. 55057. □